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Pirmohamed, SA, Debowska, A and Boduszek, D (2017) Gender differences in the correlates of academic achievement among university students. Journal of Applied Research in Higher Education, 9 (2). pp. 313-324. ISSN 1758-1184

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**Gender differences in the correlates of academic achievement among university
students**

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Manuscript accepted for publication in **Journal of Applied Research in Higher Education**

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Abstract

Purpose: Prior research has highlighted gender differences in academic motivational attributes, and how these predict academic achievement for each gender, however, a vast amount of inconsistency exists amongst such literature. The main purpose of the present study was to examine the predictive value of academic motivation (achievement goal, leaning goal, performance goal, self-efficacy, and active learning strategies) and study time in explaining academic achievement amongst male and female students.

Methodology: Cross-sectional survey design was applied. Participants were sampled opportunistically, and consisted of final year undergraduate students, including both males (n = 126) and females (n = 189) attending various courses at a UK university.

Findings: Multiple regression analysis carried out for each gender revealed that study time, active learning strategies, performance goal, and self-efficacy were significant predictors of achievement for males, whereas self-efficacy was the only significant predictor of achievement for females.

Value: These findings offer practical implications in terms of methods employed by educators to enhance academic achievement. Such implications highlight the importance of the development of self-efficacy in both genders and propose methods in which universities can enhance motivation in male and female students. Recommendations for future research are also made.

Key words: Academic achievement; Gender differences; Academic motivation; University students

Research has often determined the differences in academic achievement between males and females, frequently demonstrating an advantage for female students (Voyer & Voyer, 2014). This female-advantage expands to various educational levels and institutions, including university settings (Conger & Long, 2010). Importantly, it has been noted that gender differences in achievement cannot be explained by cognitive ability due to similar patterns in IQ scores in male and female students (Gibb, Fergusson & Horwood, 2008). This suggests that achievement disparities between gender groups are attributable to alternative factors.

Environmental or contextual factors have been posited to provide an explanation for gender differences in achievement. These factors expand to socialisation (Kangethe, Lyria & Nyamanga, 2014), gender biases in teaching (Brady & Eisler, 1995; Frawley, 2005), and gender-related biases in assessment (Woodfield, 2005). However, in addition to this, internal factors, such as academic motivation, also play a large part and could lead to behaviours such as increased study time, which could potentially help male and female students build the necessary skills and knowledge to achieve in both exams and coursework.

Indeed, the importance of motivation in academic performance has been revealed in studies among students of different cultural background (Ginsberg, 2005), at various stages of their academic career (Ivankova & Stick, 2007; Lovitts, 2001; Martin, 2009), and of different genders (Meece, Glienke & Burg, 2006; Velayutham, Aldridge & Fraser, 2012). Academic motivation, however, is conceptualised as a multi-faceted construct consisting of intrinsic-based attributes (e.g., achievement goal and learning value), extrinsic-based attributes (e.g., performance goal), and additional factors (e.g., active learning strategies and self-efficacy) (Litalien, Guay, & Morin, 2015; Tuan, Chin, & Shieh, 2005). According to the self-determination theory (SDT; Ryan & Deci, 2009), intrinsic motivators (i.e., engaging in an activity for its own sake) produce more positive academic outcomes than external regulators

(i.e., engaging in an activity as a means to an end). Consequently, in order to determine how motivational facets are related with achievement, research should explore them as separate dimensions.

Past research has indicated that males and females are likely to score differently on those various aspects of academic motivation. These gender differences are apparent within intrinsic (McGeown, Goodwin, Henderson & Wright, 2012) and extrinsic (Rusillo, Teresa, Arias, & Felix, 2004) attributes, learning strategies (Massachi, 2000), self-efficacy (Pajares & Valiante, 2001), and hours devoted to studying (Trautwein & Ludtke, 2007). Autonomous motivation was also found to mediate the relationship between self-concept and achievement in a sample of 925 high school students (Guay, Ratelle, Roy, & Litalien, 2010). However, much of this research is domain-specific as it measures motivation towards a particular task area (e.g., motivation towards learning a foreign language). This, in turn, limits its usefulness in explaining students' holistic motivation, i.e. regardless of subject or task. It is also imperative to note that much of the previous research has been conducted among students residing in educational contexts that precede university. Although gender differences in academic motivation are evident from early education (Hornstra, van der Veen, Peetsma, & Volman, 2013; Vecchione, Alessandri & Marsciano, 2014), research conducted in schools may be difficult to generalise to a university environment because being able to choose subject of study may lead to higher levels of motivation (Pintrich, 2003).

Similar empirical investigations in higher education context revealed inconsistent results. For example, whilst some studies focusing on measuring self-efficacy and using a mixed subject-area student sample found that males retain higher levels of academic self-efficacy (Shkullaku, 2013; D'Lima, Winsler & Kitsantas, 2014), other research revealed that opposite is the case (Chavez, Beltran, Guerrero, Enriquez & Reyes, 2014). Similar

inconsistencies were reported in studies investigating intrinsic and extrinsic motivation (e.g., Brouse, Basch, LeBlanc, McKnight, & Lei, 2010; Hakan & Munire, 2014; Vallerand & Bissonnette, 1992). Moreover, no significant effect of gender was found on active learning strategies (Davidson et al., 2014; Severiens & Ten Dam, 1994; Tarabashkina and Lietz, 2011). However, Becker and Ulstad (2007) as well as Drewes (2009) suggested that female undergraduates devote more hours to independent study than males and regular study habits were previously associated with high levels of motivation (Doumen, Broeckmans & Masui, 2011) and academic success (George, Dixon, Stansal, Gelb & Pheri, 2008). Given that male and female students differ in the amount of time spent on studying, it may also be that this particular factor predicts achievement to a different extent for the two genders. This supposition, however, remains to be tested.

Variations between the genders in terms of the predictive value of intrinsic and extrinsic motivational attributes on achievement have been demonstrated within literature. For example, Cortright, Lujan, Blumberg, Cox and DiCarlo (2013) reported that intrinsic motivation is related to significantly greater levels of academic achievement for male, but not for female students. However, the generalizability of these particular findings appears limited due to the use of a small sample size, and specific focus on physiology students. In a study with 419 Italian students, Vecchione et al. (2014) revealed that the predictive value of intrinsic motivation on academic outcome tended to be stronger for females, whereas the impact of extrinsic motivation was stronger for males. However, given the paucity of studies in the area, research with more diverse student populations is warranted.

Further, whilst a meta-analytic study conducted by Robbins et al. (2004) revealed that achievement motivation (both intrinsic and extrinsic) in general is a significant predictor of students' GPA (grade point average), self-efficacy was reported to be the best predictor of

both GPA and academic persistence. In another study by Turner, Chandler, and Heffer (2009), it was demonstrated that increased self-efficacy and intrinsic motivation scores are positively correlated with academic performance. Along similar lines, Hannon (2014) found that self-efficacy, epistemic belief of learning, and high-knowledge integration explained 19% and 23.2% of variance in GPA in a sample of freshmen and non-freshmen college students respectively. Students' self-efficacy was also a strong predictor of performance on both high- and low-stakes mathematics exams (Simzar, Martinez, Rutherford, Domina, & Conley, 2015). Additionally, the use of active learning strategies was suggested to have a positive effect on academic outcome (Fayombo, 2013; Taraban, Box, Myers, Pollard, & Bowen, 2007). Nevertheless, there is a lack of studies to date conducted in a university context that measure whether the extent to which both self-efficacy and active learning strategies predict achievement differs for males and females.

The current study

Studies on academic motivation are crucial to inform educators on conditions in which students can develop and flourish (Reeve, 2002). Through the deliberation of the research discussed, it becomes clear that gender differences in the presence, extent, and effect of motivational attributes amongst students exist. However, due to the inconsistencies in prior findings, it is still unclear which factors are associated with academic outcome in male and female undergraduates. As noted, past research has failed to examine the predictive value of self-efficacy, active learning strategies, and study time in explaining academic achievement in male and female students. Moreover, although the effect of motivational attributes on academic achievement has been previously explored, much research does not simultaneously investigate attributes external to these set categories to obtain a more comprehensive understanding of the gender differences in motivation. Given the above limitations, the first

objective of the current study is to investigate gender differences in academic motivation (achievement goal, leaning goal, performance goal, self-efficacy, and active learning strategies) as well as study time amongst undergraduate students. The second objective is to measure how these attributes affect and contribute to achievement grade (overall %) to a different extent for males and females. Finally, it was previously noted that the levels of motivation may differ for students at different stages of academic career (Fouladchang, Marzooghi, & Shemshiri, 2009). Additionally, many studies have focused on motivation within a specific learning domain (e.g., McGeown et al., 2012; Pajares & Valiante, 2001; Simzar et al., 2015; Taraban et al., 2007). Thus, in order to eliminate the potential impacting effects of the year and course of study, the focus of the present research will be specifically on third or final year undergraduate students from a range of subject areas.

Method

Sample

The current study employed 323 participants ($n = 126$ males, $n = 189$ females, $n = 8$ not disclosed) via an opportunistic sampling method. Participants were aged between 20 and 38 years ($M = 21.82$; $SD = 4.95$). The sample consisted of students in their third or final year of study in their undergraduate degree at a UK university. The recruitment of students from a single institution was to control for the possible impact of institutional characteristics. Participants were from various university departments, including 55 from Applied Sciences ($n = 24$ males, $n = 31$ females); 27 from Art, Design, and Architecture ($n = 7$ males, $n = 20$ females); 54 from Business and Law ($n = 25$ males, $n = 28$ females, $n = 1$ undisclosed); 34 from Computing and Engineering ($n = 28$ males, $n = 6$ females); 22 from Educational and Professional Development ($n = 3$ males, $n = 15$ females, $n = 4$ undisclosed); 61 from Human and Health Sciences ($n = 12$ males, $n = 49$ females); 69 from Music, Humanities, and Media

(n = 27 males, n = 40 females, n = 2 undisclosed). Participation was voluntary without any form of incentives or reward.

Materials

Study time. Studying time was measured with a single question: “Outside of lectures, roughly, how many hours a week do you spend studying in your own time?”.

Academic achievement. In order to measure academic achievement, participants were asked to provide their overall average grade achieved (%) in the previous academic year.

Academic motivation. Academic motivation was measured using the Students’ Motivation towards Science Learning Questionnaire (SMTSL; Tuan, Chin & Shieh, 2005). The SMTSL measures five attributes of academic motivation, including self-efficacy (SE; 7 items, $\alpha = .69$), which pertains to students’ belief in their ability to perform well; active learning strategies (ALS; 8 items, $\alpha = .76$), which assesses the extent to which students take an active role in learning to construct new knowledge; learning value (LV; 5 items, $\alpha = .68$), measuring students’ ability to perceive the importance of learning; performance goal (PG; 4 items, $\alpha = .71$), which examines students’ competitiveness in the classroom setting; and achievement goal (AG; 5 items, $\alpha = .74$), assessing students’ satisfaction as they increase their competence and achievement during learning. Items are rated on a Likert scale ranging from 1 (“strongly disagree”) to 5 (“strongly agree”).

The measure was originally devised to assess students’ motivation towards learning a science-based subject. Therefore, for the purpose of the current study, some of the scale items were revised in order to account for participants specialising in various subjects. An additional aspect of motivation (learning environment stimulation) was also omitted as it was not relevant to the present investigation.

Procedure

The research protocol was reviewed and approved by the institutional ethics panel. Once permission and assistance was acquired from each of the university's schools, the questionnaire was distributed via the circulation of invitations to institutional student email addresses. Participants completed the study online using Qualtrics, a Web interface that allows for secure remote data collection through the distribution of anonymous secure links to the protocol. Participants were required to give an informed consent before taking part in the study. All participants were debriefed after completing the questionnaire.

Results

Descriptive statistics and T-tests

Descriptive statistics, including means (M) and standard deviations (SD), together with t-tests results are presented in Table 1. Compared to males, females scored significantly higher on achievement goal and study time. Results indicated no significant difference in scores between males and females for self-efficacy, active learning strategies, learning value, performance goal or achievement grade.

Insert Table 1 about here

Multiple regression analysis

Multiple regression analyses were performed on the data in order to investigate the ability of each of the motivational factors and study time (hours) to predict academic achievement (% grade) for both males and females (Table 2). As males and females scored

differently in each of these variables, the total sample was split by gender and regression models were compared. Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, multicollinearity and homoscedasticity.

A test of the full model for males containing six independent variables against the constant-only model was statistically significant ($F_{(6, 115)} = 7.52, p < .001$) and explained 28% ($R^2 = .28$) of variance in academic achievement. Four variables made a significant unique contribution to the model. Self-efficacy ($\beta = .27, p < .01$) and performance goal ($\beta = .27, p < .001$) recorded the highest Beta values, followed by active learning strategies ($\beta = .26, p < .05$) and study time ($\beta = .18, p < .05$). A test of the full model for females containing all independent variables against the constant-only model was also statistically significant ($F_{(6, 176)} = 4.75, p < .001$) and explained 14% ($R^2 = .14$) of variance in academic achievement. Only one academic achievement dimension, self-efficacy ($\beta = .27, p < .001$), made a significant unique contribution to the model.

Insert Table 2 about here

Discussion

Very few quantitative studies with sound methodological designs have examined factors associated with academic achievement in male and female undergraduates. Additionally, a paucity of research has explored the influence of self-efficacy, active learning strategies, and study time on academic achievement in male and female students. Further, most previous investigations have employed samples from a specific learning domain (such as writing or mathematics). The purpose of the present study, therefore, was to further

elucidate gender differences in motivation (both intrinsic and extrinsic), study time, and achievement. In order to address the above limitations, another objective was to examine the role of academic motivation (achievement goal, learning goal, performance goal, self-efficacy, and active learning strategies) as well as study time in academic achievement separately for male and female undergraduate students.

The results of the present study indicate a small yet statistically significant difference between the two genders in achievement goal, which is considered to be an aspect of intrinsic motivation (Tuan et al., 2005). Specifically, our analysis suggested that female undergraduates are more likely to score higher on this variable than males and this finding is consistent with previous research in the area (e.g., Vallerand & Bissonnette, 1992). Interestingly, however, no significant gender difference was detected for another factor of internal motivation, namely learning value. Therefore, it seems that it is not the value female students perceive course content adds to their lives, but the internal satisfaction that they gain from increased skill and achievement that differs from male students. Based on these findings, it also appears that intrinsic motivation is not a unidimensional concept and hence its aspects should be studied separately, especially when exploring gender differences in such attributes. Despite the fact that previous research has implemented a scale measure that claims to assess multiple subscales of intrinsic and extrinsic motivation (e.g., an adaption of The Academic Motivation Scale, Vallerand et al., 2011), ultimately, the gender difference between each of these subscales are not presented and discussed (e.g., Hakan & Munire, 2014).

Although there is a selection of past research that has indicated higher scores on extrinsic motivation for males than females (e.g., Hakan & Munire, 2014; Vallerand & Bissonnette, 1992), our findings do not confirm this. As in the case with intrinsic motivation discussed above, a possible reason for this indefinable gender difference amongst literature is

the varying extent to which studies account for the possible multidimensionality of extrinsic motivation. Nonetheless, it is important to note here that, whilst the focus of the current study was on one aspect of extrinsic motivation only, i.e. performance goal, male students may have been more motivated on other extrinsic constructs not included in our analysis. The present findings, however, still remain inconsistent with many past studies that have taken a similar approach, and found males to retain high levels of performance goal orientations (e.g., D'Lima et al., 2014; Fouladchang et al., 2009).

In regards to study time, a significant gender difference in favour of female students emerged from the analysis, which is consistent with patterns reported in prior research (e.g., Becker & Ulstad, 2007; Drewes, 2009). Mkumbo and Amani (2012) previously found that female undergraduates attribute their academic success or failures to more internal and controllable factors, such as effort, whilst male undergraduates make more attributions to uncontrollable external factors, such as luck. Therefore, it may be that females, through the belief that the outcome of a particular task is attributable to the amount of study effort, are more likely to apply more time and work in order to succeed or avoid failure in future academic tasks.

Further, previous research indicated that factors associated with academic achievement may differ for male and female students (e.g., Cortright et al., 2013; Vecchione et al., 2014). Although our findings are in agreement with this assumption, it was also found that self-efficacy predicts academic achievement regardless of gender. Previous research has consistently demonstrated the importance of the effect of self-efficacy on performance (Hannon, 2014; Robbins et al., 2004; Siriparp, 2015; Turner et al., 2009). Indeed, we found that, among the female sample, self-efficacy was the only significant predictor, whereas among males, it was one of the strongest predictors of academic achievement; both outcomes subsequently highlight the importance of such a construct in education. It appears that male

and female students with a strong sense of self-efficacy are likely to exert a higher amount of effort into goals they believe themselves to be capable of (Peterson & Arnn, 2008), which, as demonstrated here, translates into academic success. This finding has an important practical implication. Specifically, it seems that educational institutions should assign to building and improving self-efficacy in all students, to ultimately enable them to perform and achieve to their highest potential.

Previous findings suggested a positive significant effect of active learning strategies on study outcome (Fayombo, 2013; Taraban et al., 2007), however, there is a lack of research exploring this effect separately for male and female undergraduate students. The current results are partly supportive of the prior results, but important gender differences were detected. Namely, active learning strategies appear to be a significant predictor of academic achievement for males, but not for females. One possible explanation is that male learners are more likely to ask for clear evidence to support a teacher's claim, whereas female learners are more comfortable with less logical sequencing (Guarian, 2010). It appears hence that males are able to make sense of concepts to a greater extent if they can actively understand the logic behind it, so that active and logical connections can be made. Indeed, previous studies have highlighted gender differences in strategies used to achieve the same cognitive ability (Lenroot & Giedd, 2010).

Another significant predictor of achievement in males was performance goal. This finding remains consistent with research that highlights the predictive value of extrinsic attributes on achievement for males (Vecchione et al., 2014). Prior research has also discovered that the presence of performance goal orientations in male students is significantly associated with an increased use of metacognitive strategies, and hence increased academic performance. It therefore appears that competing for external incentives, such as attention from authority or achievement grade, is likely to motivate male students, encouraging the

investment of greater effort and determination, and hence maintaining the quality of cognitive commitment and valuable behaviour which leads to success (Bouffard, Boisvert, Verzeau & Larouche, 1995). Not only does this research demonstrate the importance of performance goal in relation to achievement, but it also highlights the advantage a ‘competitive’ outlook and approach to academia has for male students only. Additionally, although many have regarded competition in education as counterproductive (Kai, 2012) and the self-determination theory (Ryan & Deci, 2009) assumes that intrinsic motivation leads to more positive academic outcomes, the present findings indicate that this is not always the case.

The final significant factor correlated with academic achievement among males was study time. Although female students are more likely to devote more time to independent study than males (Becker & Ulstad, 2007; Drewes, 2009), this does not appear predictive of their academic success. As such, it could be that an adequate amount of time devoted to independent study is perhaps a ‘given’ amongst female students, irrespective of cognitive and academic ability, but not amongst males. Consequently, male students who do value the importance of studying, are more likely to exert more effort into doing so, which subsequently facilitates achievement. However, as past research has not commonly measured these particular variations amongst gender, the above claims remain to be further explored.

This research, however, should be interpreted in light of some limitations. Firstly, we failed to control for factors external to motivation, such as the learning environment, student-teacher relationships, and socioeconomic background. As these factors have been found to be related to achievement within a university environment in previous studies (Lizzio, Wilson & Simons, 2002; Okello, 2014; Young, Johnson, Arthur, & Hawthorne, 2011). The inclusion of such additional variables could explain a greater amount of variance in achievement grade. Further, the present study utilised a student sample from one UK university only. Despite this limitation, the recruitment of students undertaking diverse courses aids the extent to which

findings can be generalised to a large student population. However, alongside this, it should also be acknowledged that the gender breakdown across some disciplines were not always proportionate. For example, whilst 28 males were employed from the Computing and Engineering discipline, the sample included only six females. Although this may be considered a design flaw of the present study, it is representative of the distribution of male and female undergraduate students who enrol in STEM subjects, such as computing and engineering (Hango, 2013).

Importantly, the current findings can guide the development of workshops and exercises to encourage and develop students' confidence. In addition to this, institutions should continue to provide constructive feedback throughout the year, which incorporates positive and encouraging references to the student's work. A positive feedback experience for students has been found to lead to an increase in self-efficacy, increased efforts to learn, and as a result, an increase in performance (Dupret, 2015; Parboteeah, 2009). Further, given the gender difference in significant predictors of academic achievement, such programmes should be developed specifically for male and female undergraduates. For example, for males, who were generally found to retain lower levels of achievement goal motivation, this attribute could be strengthened through the communication of why the skill and achievement gained through participation of the course is of value to them, and the accentuation of how it is likely to aid individuals once they graduate. Perhaps, if universities were to provide regular information and reminders about the necessary skills employers require in desired graduate jobs, the internal satisfaction gained from the development of these skills would also increase. In some way, this ultimately creates an 'incentive', which is perhaps likely to be particularly encouraging for performance-goal oriented male students. In the same way, university institutions should continue to stress the importance of independent study. It would perhaps be effective for personal tutors to assist students in creating study schedules to refer

back to, as time management is often an aspect that students struggle with at university despite it being directly linked to performance (Aduke, 2015; Dalli, 2014).

Overall, the current study found females to score significantly higher than males on achievement goal and study time. Moreover, academic achievement was found to be correlated with self-efficacy for female students, whereas positive academic outcome among males was associated with study time, active learning strategies, performance goal, and self-efficacy. These results provide further evidence for gender differences in motivation and performance as well as significantly extend the current understanding of gender-specific correlates of academic achievement. Based on the present findings, it is advisable that educators focus on developing the construct of self-efficacy from early years of education. It appears that this would allow both males and females to achieve throughout, and be better prepared to succeed when they make the transition to a university level (Morton, Mergler, & Boman, 2014).

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Table 1

Descriptive statistics and t-test results for males (n = 126) and females (n = 189)

Variable	Males		Females		95% CI	t	Cohen's d
	M	SD	M	SD			
Self-efficacy	27.33	3.69	26.62	3.71	-.12/1.56	1.68	n/a
Active learning strategies	32.28	3.46	32.71	3.58	-1.23/.38	1.04	n/a
Learning value	19.73	2.69	19.74	2.68	-.62/.60	.04	n/a
Performance goal	10.99	3.20	11.36	2.67	-1.05/.31	1.06	n/a
Achievement goal	18.53	3.51	19.59	2.87	.32/1.80	2.93**	.33
Study time (hours)	4.17	1.55	4.54	1.42	.03/.71	2.19*	.25
Achievement grade (%)	64.61	10.10	65.95	8.59	-2.76/1.40	.65	n/a

Note. * $p < .05$, ** $p < .01$

Table 2

Multiple regressions predicting academic achievement grade for males and females

	Males			Females		
	β	SE	B (95% CI)	β	SE	B (95% CI)
Self-efficacy	.27**	.27	.74 (.21/1.27)	.27***	.16	.54 (.23/.86)
Active learning strategies	.26*	.30	.76 (.17/1.35)	.13	.19	.27 (-.11/.66)
Performance goal	.27***	.26	.85 (.33/1.37)	.08	.22	.22 (-.20/.65)
Achievement goal	-.02	.25	-.05 (-.56/.45)	-.10	.21	-.27 (-.68/.14)
Learning value	-.10	.39	-.36 (-1.13/.41)	-.12	.23	-.33 (-.79/.14)
Study time	.18*	.53	1.19 (.14/2.23)	.12	.38	.64 (-.11/1.40)

Note. * $p < .05$, ** $p < .01$, *** $p < .001$